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Active and passive smoking among asthmatic Missourians: Implications for health education

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Abstract

Objectives. To estimate the prevalence of smoking and exposure to secondhand smoke among asthmatic Missourians and to describe associated predisposing factors.

Method. The Missouri County-level Behavioral Risk Factor Survey, conducted among 15,059 non-institutionalized Missourians aged 18 years or older using random-digit-dialed telephone interviews during 2002–2003, was used in this study.

Results. Current smoking (28.4%) and regular exposure to secondhand smoke (19.9%–36.4%, depending on the setting) were prevalent among asthmatic Missourians. Among asthmatics, those with college or technical school education were less likely to be current smokers compared to those with less than a high school education [odds ratio (OR) = 0.25, 95% confidence interval (CI): 0.11, 0.57]; African Americans were less likely to be current smokers than white (OR = 0.24, 95% CI: 0.07, 0.83); however, among asthmatic non-current smokers, African Americans were more likely to expose to secondhand smoke one or more days per week inside home than whites. Of the asthmatic current smokers who had visited a physician in the past 12 months, 30.0% were not advised by health care professionals to quit smoking.

Conclusions. Asthma intervention programs should strengthen smoking cessation components and should educate health care professionals about the importance of advising asthmatic patients to quit smoking.

Keywords: Asthma; Smoking; Secondhand smoke; Disease management

Introduction

Asthma is a common and costly chronic disease in the United States, accounting for approximately 500,000 hospitalizations, 5000 deaths (NHLBI, 1999), and 134 million days of restricted activity annually (NCHS, 1998). Factors affecting the development of asthma are poorly understood; therefore, primary prevention of asthma is not feasible. However, asthma can be successfully controlled, and asthmatic events can be prevented. Disease management plays an important part in reducing asthma-related morbidity and mortality. Patient education on factors that aggravate asthma and trigger attacks is an important component of asthma management.

Active smoking and exposure to secondhand smoke are known to be triggering and aggravating factors for asthma (Becklake and Ernst, 1997; Koren, 1997). Research shows that, compared to asthmatics who have never smoked, current smokers with asthma have more frequent attacks, more severe symptoms, accelerated decline in lung function, higher hospitalization rates, and increased mortality following a near-fatal attack (Althuis et al., 1999; Marquette et al., 1992; Siroux et al., 2000; Sipple et al., 1999). Compared to asthmatic ex-smokers, current smokers with asthma have more frequent attacks and more severe symptoms (Siroux et al., 2000). Exposure to secondhand smoke in asthmatics is associated with more symptoms, poor quality of life, reduced lung function, and increased hospitalizations and emergency room visits (Sipple et al., 1999; Cassino et al., 1999; Lange et al., 1998; Marks et al., 1997; Silverman et al., 2003). Therefore, raising the awareness of adverse effects of smoking and exposure to secondhand

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smoke and reducing smoking prevalence are important strategies in asthma management.

Adults with asthma are expected to have a lower prevalence of cigarette smoking compared to the general population because they experience respiratory symptoms. However, epidemiologic data show that the smoking prevalence is similar in asthmatics as in the general population (Sipple et al., 1999; Silverman et al., 2003; Eisner et al., 2000; Turner et al., 1998). Prevalence of current smoking among asthmatics ranges from 17% to 35% in different studies, with the highest rates being found among asthmatics presenting at emergency rooms with acute attacks (Althuis et al., 1999; Siroux et al., 2000; Sipple et al., 1999; Silverman et al., 2003; Eisner et al., 2000; Turner et al., 1998). Few studies, however, have examined exposure to secondhand smoke among asthmatics and factors predisposing asthmatics to active smoking and exposure to secondhand smoke.

This study seeks to investigate the prevalence of smoking and exposure to secondhand smoke among asthmatic Missourians; to describe risk factors predisposing asthmatic Missourians to smoking and exposure to secondhand smoke, including lack of advice by health care professionals for smoking cessation and lack of smoking control policies in the workplace; and to identify socio-demographic risk factors associated with current smoking status or exposure to secondhand smoke among asthmatic Missourians.

The Institutional Review Board in the Missouri Department of Health and Senior Services reviewed the study protocol and determined it to be exempt.

Methods

The data for this study were from the Missouri County-level Behavioral Risk Factor Survey. The survey was conducted during 2002–2003 and used random-digit-dialed telephone interviews among non-institutionalized adults aged 18 years or older in Missouri. The sample was drawn from all 114 counties and the city of St. Louis. To assure representation of African Americans, we over-sampled ZIP code areas where African Americans represent more than 40% of the population in the City of St. Louis and more than 18% of the population in Jackson County (Kansas City) and in the six-county Bootheel area (Dunklin, Pemiscot, Scott, Stoddard, Mississippi, and New Madrid). Four counties with large Metropolitan Statistical Areas were divided into urban and rural strata. The data collection followed the standard Behavioral Risk Factor Surveillance System (BRFSS) protocol. The final sample size of the study is 15,059. The overall response rate of the survey is 60.9%.

The questionnaires included the core and optional questions in the Adult Tobacco Survey as well as selected questions on key chronic diseases and behavioral risk factors and all of the demographic questions in the BRFSS.

Variable definitions

An asthmatic person is an individual who had been told by a doctor, nurse, or other health professional that he or she had asthma and reported still had asthma at the time of the survey. A current smoker is a person who had smoked at least 100 cigarettes in his or her lifetime and who now smokes cigarettes every day or on some days. Living with smokers is defined as living in a residence with at least one person (other than the respondent) who currently smokes cigarettes. Exposure to smoking or secondhand smoke inside the home is defined as having someone (including the respondent) smoking cigarettes, cigars, or pipes somewhere inside the home in the past 7 days. Exposure to secondhand smoke in vehicles is having been in a vehicle with someone smoking in the past 7 days. Smoking or exposure to secondhand smoke at the workplace is having someone (including the respondent) smoking in the respondent's work area in the past 7 days. Having been advised to quit smoking refers to a current smoker having seen a health professional in the last 12 months and was advised by the health care professional to quit smoking. Attempting to quit is having reportedly stopped smoking for at least 1 day during the past 12 months for the purpose of smoking cessation.

Data analysis

Prior to the analysis, the data were weighted to account for the unequal probability of selection, differential non-response, and possible deficiencies in the sampling frame. The weighted data were analyzed using STATA (SE 8.2, StataCorp, College Station, Texas). The complex survey design was taken into account by using sampling weights and the Taylor-series linearization variance estimator. We calculated and reported the weighted prevalence and 95% confidence intervals (CIs) for smoking-related measures (i.e., smoking, exposure to secondhand smoke, smoking-related policies and rules, and advice from healthcare professionals) and stratified the data by both current smoking status and asthmatic status. Design-based F test (Stata Corporation, 2003) was used to compare the prevalence of smoking-related measures across smoking and asthmatic categories. When smoking policies or rules were compared, the response was dichotomized into two categories (i.e., "not allowed anywhere" and "allowed at least somewhere or no rules"). We used logistic regression to identify factors associated with current smoking status among asthmatics (n = 1251) and factors associated with exposure to secondhand smoke inside home one or more days in the past 7 days among asthmatic non-current smokers (n = 869).

Results

A total of 15,059 respondents (5774 men and 9285 women) participated in the study. The mean age of the respondents was 52 years (range 18–99 years). We included 14,995 participants (5755 men and 9240 women) who have complete information on current asthma status. Overall, 7.9% of Missourians (9.0% of women and 6.6% of men) reportedly were living with asthma. An estimated 28.4% (95% CI: 22.4, 34.4) of asthmatics reported that they currently smoked, compared to 26.1% (95% CI: 23.9, 29.2) among non-asthmatics. More than one fifth (21.8%) of asthmatic Missourians reported that someone smoked in their home every day during the past 7 days, more than a third of asthmatic Missourians (36.4%) were exposed to secondhand smoke in a vehicle, and nearly a fifth (19.9%) reported that someone smoked in their workplace during the previous 7 days. About one fifth of asthmatic Missourians (22.4%) had no rules

about smoking in their homes or vehicles (21.4%), and about a quarter (25.8%) of the asthmatics work in places where at least some smoking is allowed or there is no official smoking policy. An estimated 86.1% of the asthmatics had visited a health care professional in the last 12 months. Among those asthmatic Missourians, 70.0% of current smokers had been advised about smoking cessation. Approximately half of the asthmatic smokers (47.8%) and non-asthmatic smokers (49.0%) alike reported that they had attempted to quit smoking in the past 12 months. There were no statistically significant differences between asthmatic and non-asthmatic Missourians on any of the above measures (Table 1).

When we further stratified the data by asthmatic and smoking status, we found that, compared with nonsmokers, current smokers were more likely to live with smokers; they were also likely to smoke or be exposed to secondhand smoke inside home, in cars, or in workplaces. However, being an asthmatic did not affect current smoking status or exposure to secondhand smoke. Furthermore, current smokers tended to have less strict smoking rules inside the home or in cars and were more likely to work in places with less strict smoking policies. Again, asthmatic status did not affect the smoking rules/policies in cars or in the work place. However, asthmatic current smokers tend to have more strict smoking rules inside home than non-asthmatic current smokers (Table 1).

When we examined factors associated with being a current smoker among asthmatics and factors associated with exposure to secondhand smoke one or more days per week inside home among asthmatic non-current smokers, we found a significant inverse association between educational attainment and current smoking status ($P < 0.05$). After controlling for other socio-demographic factors, asthmatics who were college or technical school graduates were less likely than those with less than a high school education to be current smokers [odds ratio (OR) = 0.25, 95% confidence interval (CI): 0.11, 0.57]. Compared to those aged 18 to 24 years, asthmatics aged 65 years or older were less likely to be current smokers (OR = 0.07, 95% CI: 0.07, 0.18). African American asthmatics were less

Table 1
Comparison of smoking-related indicators between asthmatics and non-asthmatics, by current smoking status, Missouri, 2002–2003

Indicators	Asthmatics			Non-asthmatics		
	Prevalence (%) (95% CI)			Prevalence (%) (95% CI)		
	Overall	Current smokers	Non-current smokers	Overall	Current smokers	Non-Current smokers
Number of subjects	1251	377	869	13,744	10,258	3431
Smoking or exposure to secondhand smoke						
Living with smokers	28.9 (23.4–34.5)	51.0 (36.2–65.7)	19.7 (14.0–25.4)[a]	29.8 (27.3–32.3)	59.7 (54.5–64.8)	18.9 (16.6–21.2)[a]
Smoking or exposure to secondhand smoke inside home						
1–6 days/per week	8.2 (5.1–11.3)	9.9 (5.1–14.6)	7.4 (3.4–11.4)	5.9 (4.9–6.9)	8.6 (6.8–10.4)	4.9 (3.7–6.0)
7 days/per week	21.8 (17.4–26.2)	53.8 (40.1–67.6)	9.4 (5.6–13.1)[a]	19.4 (17.9–21.0)	54.8 (49.7–59.9)	6.9 (5.9–8.0)[a]
Exposure to secondhand smoke in cars	36.4 (30.2–42.6)	71.7 (61.8–81.6)	22.3 (16.6–27.9)[a]	31.5 (29.4–33.6)	72.2 (68.0–76.5)	17.0 (15.3–18.8)[a]
Smoking or exposure to secondhand smoke in workplaces	19.9 (8.3–31.1)	36.6 (10.6–62.7)	11.6 (5.7–17.5)	18.6 (15.2–22.2)	31.2 (22.0–40.4)	13.6 (10.9–16.4)[a]
Smoking policy/rules						
Smoking inside home						
Not allowed anywhere	61.3 (55.8–66.9)	31.2 (15.6–46.8)	73.5 (67.8–79.1)[a]	61.3 (55.8–66.9)	11.7 (9.1–14.2)[b]	69.2 (66.8–71.5)[a]
Allowed in some places or at some times	12.1 (8.9–15.2)	17.8 (11.3–24.2)	9.5 (5.9–13.2)	12.1 (8.9–15.2)	26.9 (22.3–31.5)	9.8 (8.4–11.2)
Allowed anywhere	4.2 (2.5–5.9)	11.6 (5.9–17.3)	1.3 (0.34–2.2)	4.2 (2.5–5.9)	24.8 (19.2–30.5)	3.7 (2.4–4.9)
No rules	22.4 (17.9–27.0)	39.5 (27.8–51.2)	15.8 (11.2–20.3)	22.4 (17.9–27.0)	36.6 (32.3–40.8)	17.4 (15.5–19.2)
Smoking inside car						
Not allowed anywhere	54.5 (48.1–60.8)	7.6 (3.4–11.9)	73.1 (67.3–78.9)[a]	54.5 (48.1–60.8)	11.7 (9.1–14.2)	69.2 (66.8–71.5)[a]
Allowed at some times	14.4 (10.5–18.4)	19.2 (10.6–27.7)	12.6 (8.2–17.0)	14.4 (10.5–18.4)	26.9 (22.3–31.5)	9.8 (8.4–11.2)
Allowed anywhere	9.3 (7.4–11.2)	27.7 (11.1–44.2)	2.6 (0.01–5.3)	9.3 (7.4–11.2)	24.8 (19.2–30.5)	3.7 (2.4–4.9)
No rules	21.4 (17.0–25.8)	45.6 (32.4–58.7)	11.7 (8.2–15.2)	21.4 (17.0–25.8)	36.6 (32.3–40.8)	17.4 (15.5–19.2)
Smoking in working places						
Not allowed in any work areas	74.2 (63.0–85.4)	59.5 (34.4–84.7)	81.5 (73.9–89.0)	74.2 (63.0–85.4)	63.6 (54.8–72.3)	77.7 (74.4–81.0)[a]
Allowed in some work areas	22.8 (11.4–34.2)	36.4 (10.1–62.6)	16.1 (8.7–23.4)	22.8 (11.4–34.2)	27.3 (18.5–36.1)	14.8 (11.9–17.8)
Allowed in all work; areas	1.2 (0.2–2.1)	1.9 (0–3.8)	0.83 (0–1.9)	1.2 (0.2–2.1)	2.0 (0.4–4.0)	1.8 (0.56–7.0)
No official policy	1.8 (0.8–2.8)	2.2 (0.55–3.9)	1.7 (0.32–3.0)	1.8 (0.8–2.8)	7.1 (2.2–12.0)	5.6 (4.3–7.0)
Advise from health care professionals						
Advised to quit smoking	–	70.0 (57.2–82.9)	–	–	62.2 (56.3–68.0)	–
Smoking cessation						
Attempts to quit	–	47.8 (38.4–57.3)	–	–	49.0 (44.1–53.9)	–

[a] Compared to smokers in the same asthmatic categories, $P < 0.05$, two-tailed test.
[b] Compared to asthmatics in the same smoking categories, $P < 0.05$, two-tailed test.

likely to be current smokers (OR = 0.24, 95% CI: 0.07, 0.83) than their white counterparts. Conversely, African American asthmatic non-current smokers were more likely to be exposed to secondhand smoke one or more days per week inside home (OR = 2.98, 95% CI: 1.13, 7.86) than their white counterparts. We did not find any significant associations between education, age, or gender with exposure to secondhand smoke inside home one or more days per week among asthmatic nonsmokers (Table 2).

Discussion

This study found that a high proportion of asthmatic Missourians are current smokers or are exposed to secondhand smoke. In addition, almost a third of the asthmatics who were current smokers and had visited a physician during the last 12 months were not advised by health care professionals to quit smoking. Because cigarette smoke is an important trigger for an asthma attack, the National Asthma Education and Prevention Program recommends that no patients with asthma should smoke or be exposed to secondhand smoke. Additionally, physicians should review smoking status at the initial visit and all subsequent visits of asthmatic patients; if the patient smokes or is regularly exposed to secondhand smoke, physicians should encourage the patient or their family members to stop or reduce smoking (NAEPP, 1997).

We found that asthmatic Missourians smoke and are exposed to secondhand smoke at similar levels as non-asthmatic Missourians. Similar findings have been observed in previous studies (Sipple et al., 1999; Silverman et al., 2003; Eisner et al., 2000). In the general population, low education attainment is one of the most important associates for smoking (Flint and Novotny, 1997; Escobedo et al., 1990; Escobedo and Peddicord, 1996; Lowry et al., 1996; Pierce et al., 1980, Zhu et al., 1996). A similar educational gradient in smoking prevalence has been described for adults with asthma (Eisner et al., 2000). The findings of this study corroborate the results of those previous studies.

The strengths of this study include a large statewide representative sample and a broad-ranged smoking-related measures, e.g., smoking, exposure to secondhand smoke, smoking-related policies and rules, and advice from healthcare professionals. The main limitation of this study is that both the asthmatic status and smoking status are self-reported. Research has shown that cigarette smoking is slightly underreported in the general population (Wells et al., 1998; Wagenknecth et al., 1992). However, it is unclear whether smoking status is differentially underreported between asthmatic and non-asthmatic persons. Furthermore, the impact of such differential reporting, if any, is unknown.

Education about risk factors and triggers for asthma is essential for the successful management of asthma. Effective education is usually developed in a patient–provider partnership, which is tailored to the individual patient's needs. At a minimum, a competent educator enlists and encourages family supports, includes instructions on self-management skill, and integrates education with routine ongoing care (NAEPP, 1997). In this study, the lack of smoking-related rules inside the homes and in vehicles suggests the lack of awareness of the adverse effects of smoking and exposure to secondhand smoke on asthmatics among patients and their family members. It is also likely that, although asthmatics and their family members are more aware of the adverse effect of smoking, nicotine dependence makes it hard to quit. Therefore, public health programs on asthma prevention should collect information regarding the knowledge of the public, especially asthmatic

Table 2
Factors associated with current smoking status or exposure to secondhand smoke among asthmatic Missourians, 2002–2003

	Categories	Current smoking status among asthmatics current smoker (n = 1251)		Exposure to secondhand smoke 1+ days per week inside home among asthmatic non-current smokers (n = 869)	
		Prevalence (%) (95% CI)	Adjusted POR (95% CI)	Prevalence (%) (95% CI)	Adjusted POR (95% CI)
Age	18–24	35.3 (18.2, 52.4)	1.00 (reference)	24.6 (8.8, 40.5)	1.00 (reference)
	25–34	25.6 (13.0, 38.2)	0.63 (0.22, 1.79)	10.2 (3.2, 17.2)	0.38 (0.13, 1.08)
	35–44	41.2 (30.4, 52.0)	1.28 (0.55, 2.98)	22.9 (11.0, 34.8)	1.59 (0.64, 3.98)
	45–54	28.8 (18.2, 39.4)	0.73 (0.29, 1.84)	18.3 (6.5, 30.1)	1.06 (0.38, 2.99)
	55–64	26.0 (16.2, 35.8)	0.48 (0.20, 1.13)	12.4 (4.1, 20.7)	0.64 (0.24, 1.71)
	65+	4.9 (2.0, 7.8)	0.07 (0.03, 0.18)**	10.9 (2.3, 19.4)	0.57 (1.67, 1.93)
Race	White	29.9 (22.9, 36.9)	1.00 (reference)	13.9 (9.9, 17.9)	1.00 (reference)
	African American	14.5 (2.7, 26.4)	0.24 (0.07, 0.83)*	36.9 (11.3, 62.6)	2.98 (1.13, 7.86)*
	Others	34.3 (12.2, 56.5)	0.89 (0.33, 2.43)	17.2 (0.0, 38.0)	1.20 (0.24, 6.11)
Gender	Male	27.4 (14.9, 39.9)	1.00 (reference)	20.2 (10.4, 30.0)	1.00 (reference)
	Female	29.1 (23.4, 34.7)	0.92 (0.49, 1.76)	14.4 (8.8, 20.1)	0.57 (0.28, 1.14)
Education[#]	Less than high school	31.5 (20.1, 43.0)	1.00 (reference)	20.9 (2.2, 39.6)	1.00 (reference)
	High School or GED	33.7 (25.3, 42.1)	0.69 (0.38–1.26)	19.9 (11.7, 28.0)	1.24 (0.43, 3.62)
	Attended college or technical school	28.7 (13.3, 44.0)	0.52 (0.23–1.15)	19.2 (9.1, 29.3)	1.9 (0.36, 3.92)
	College or technical school graduate	17.8 (8.4, 27.3)	0.25 (0.11–0.57)**	7.5 (0.6, 14.5)	0.37 (0.07, 1.82)

Significantly different from the reference groups after controlling for other socio-demographic factors, *$P < 0.05$, **$P < 0.001$.
Trends across 4 education categories, [#]$P < 0.05$.
POR: prevalence odds ratio.
CI: confidence interval.

patients and those around them, about the harmful effect of smoking and exposure to secondhand smoke for asthma patients. If they are found lacking of such knowledge, educational campaigns should be considered to raise the awareness. If, however, nicotine dependence is the culprit, smoking cessation services should be provided by public health programs or healthcare professionals to help asthmatics quit smoking.

Conclusions

A high proportion of asthmatic Missourians are either current smokers or regularly exposed to secondhand smoke. A lack of advice from health care professionals may be a contributing factor to the high prevalence rates. Asthma intervention programs should identify the reasons for high smoking rates among asthmatics and should include strong education and smoking cessation components in the programs. Health care professionals should follow the guidelines provided by the National Asthma Education and Prevention Program on the management of asthma to provide education on the adverse effect of smoking and exposure to secondhand smoke for asthmatic patients.

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